

## PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

## Improvements relating to Combination Locks.

I, HEINRICH BECK, of No. 1c, Wilhelmstrasse, Vienna XII, Austria, Austrian Citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to combination locks of the kind in which locking bodies, such as balls, rollers or the like, engage in recesses in a stem and thus secure thereon a carrier of such locking bodies embracing the stem, such carrier being itself embraced by rotatable locking rings bearing figures or the like and having recesses into which the locking bodies can recede when the locking rings are in appropriate angular positions.

According to the present invention, the locked stem of a combination lock as above described, is formed with a screw threaded bore and constitutes a nut for securing an object, for example a nut for securing a spare wheel to a motor vehicle. Constructional examples of combination locks the stems of which serve as nuts, are illustrated on the accompanying drawing, in which:—

Fig. 1 is an end elevation partly in transverse section along the line *c—d* of Fig. 2 of one embodiment of combination lock, and

Fig. 2 is a corresponding longitudinal section along the line *a—b* of Fig. 1.

Fig. 3 is a longitudinal section of a modified construction.

Referring more particularly to Figs. 1 and 2: 1 is a hollow stem of hexagonal or other flat-provided section, the bore of which is screwthreaded at 2 so that the stem itself can serve as a nut for securing an object, for instance for securing a spare wheel to a motor vehicle.

The periphery of the stem 1 is formed with bevelled sided transverse grooves 3 engaged by locking balls 4 when the lock is applied to the stem 1.

These locking balls are contained in radial bores of a carrier or sleeve 6, which by its central hexagonal aperture is fitted over the hexagonal stem 1.

Embracing and freely rotatable about the sleeve 6, are two rings 7, 8 externally

bearing figures or other characters. These rings 7, 8 normally retain the balls 4 protruded from the radial bores 5 of the sleeve 6 into engagement with the grooves 3, but each is formed with a recess 9 into which, if opposite the respective ball, such ball can recede on riding up the bevelled side of the respective groove 3, on withdrawal of the lock from the nut-stem 1. The recesses 9 assume the unlocking position in which the balls 4 can recede thereinto, on the rings 7, 8 being so angularly adjusted as to bring the opening combination of figures in alignment with a pointer 17.

The mouths of the recesses 9 are each closed by a plate 10 inwardly pressed by a spring 11 into frictional contact with the peripheral surface of the sleeve 6, thus acting as brakes to restrain the rotation of the figure-bearing rings 7, 8 around the sleeve 6. This braking action is promoted by the plates 10 being each provided with a rib 10<sup>a</sup> which snaps into longitudinal grooves 12 formed in the periphery of the sleeve 6.

These spring-pressed plates 10 are curved to form continuations of the surface of the rings 7, 8, bridging over the recesses 9 and thus tending to baffle discovery of the unlocking positions of the rings. Moreover the clicks due to the ratchet action of the pawl ribs 10<sup>a</sup> are also deceptive.

The outer end of the sleeve 6 is covered by a freely rotatable cap 15, secured by a divided sprung ring 16 engaged in annular grooves in the sleeve 6 and cap 15 respectively as shown in Fig. 2. Alternatively as shown in Fig. 3 the sleeve 6 has a closed end disc integral therewith.

The cap 15 shown in Fig. 2 has an outwardly directed flange 15<sup>a</sup>, between which and a flange 18 on the sleeve 6, the figured rings 7, 8 are held against axial displacement.

Two studs 19, 20 are also provided protruding from the flange 18 of the sleeve 6 and serve to engage in corresponding holes in the object secured on the nut-stem 1 (the spare wheel) to prevent relative rotation thereof. Instead of the studs 19, 20

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bosses or other projections may be provided on the end of the sleeve 6 or flange 18 for the same purpose.

The adjoining sides of the recesses 9 in the rings 7, 8 are closed by an annular disc or washer 21 covered by a flange of the ring 8.

In the modified construction shown in Fig. 3, the figured ring 7 has an axially directed flange 7<sup>a</sup> which overhangs and encloses the other ring 8, which latter is secured on the sleeve 6 by a divided washer ring 16<sup>a</sup> sprung into opposed annular grooves similarly to the cap 15 shown in Fig. 2. In this construction the figures for setting the combination and an index mark therefor are provided on the front faces of the rings 7, 8 and sleeve 6 where indicated by the arrows in Fig. 3.

The lock when locked in position on the stem 1 which is formed as a nut prevents the application of a spanner to the flats thereof and thus removal of the nut, and being non-rotatable relative to the object secured prevents the nut being removed by rotation of the lock itself.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A combination lock wherein locking bodies, such as balls or the like engage in recesses in a stem and secure thereon a carrier of such locking bodies, such carrier being embraced by rotatable figured locking rings having recesses into which the locking bodies can recede, in which the so-locked stem is formed with a screwthreaded bore and constitutes a nut.

2. A combination lock as set forth in claim 1, in which the carrier of the locking bodies is non rotatable on the stem. 45

3. A combination lock as set forth in claim 1 or 2, in which the carrier is a sleeve closed at one end by an inseparably secured cap rotatable relatively thereto.

4. A combination lock as set forth in claim 3, in which the cap also secures the locking rings against axial displacement. 50

5. A combination lock as set forth in claim 1 or 2, in which the rings are secured on the carrier by one thereof being inseparably but rotatably secured thereto. 55

6. A combination lock as set forth in any of the foregoing claims, in which the recesses in the locking rings for the recession of the locking bodies are bridged by spring-pressed plates bearing against the carrier. 60

7. A combination lock as set forth in claim 6, in which the spring-pressed plates are curved to form continuations of the surface of the locking rings. 65

8. A combination lock as set forth in claim 6 or 7, in which the spring-pressed plates have pawl ribs coacting with grooves in the carrier. 70

9. A combination lock as set forth in any of the foregoing claims, provided with means for engaging the object secured and preventing rotation of the carrier relatively thereto. 75

10. The improved combination lock, substantially as described and illustrated.

Dated this 8th day of May, 1929.

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323,444 COMPLETE SPECIFICATION

1 SHEET

[This Drawing is a reproduction of the Original on a reduced scale.]

